

5           1. A system for transporting a secondary communication signal from a  
secondary synchronous optical network (SONET) ring on a primary synchronous  
optical network (SONET) ring which has a primary communication signal,  
wherein the secondary communication signal has secondary overhead including  
secondary section overhead and the primary communication signal has primary  
10 overhead including secondary section overhead, the system comprising:

          a first adapter assembly adapted to receive the secondary communication  
signal from the secondary SONET ring and the primary communication signal  
from the primary SONET ring, to combine the secondary overhead with the  
primary overhead to form a transport overhead wherein the secondary section  
15 overhead is combined into the unused space of the primary overhead, to  
combine the secondary payload with the primary payload to form a transport  
payload and to combine the transport overhead with the transport payload to  
form a transport communication signal for transport across a communications  
path of the primary SONET ring; and

20           a second adapter assembly adapted to receive the transport  
communication signal from the primary SONET ring, to remove the secondary  
overhead from the transport overhead, to remove the secondary payload from  
the transport payload, and to combine the secondary overhead with the  
secondary payload to create the second secondary communication signal for  
25 transport to the secondary SONET ring.

          2. The system of claim 1, wherein the second adapter assembly is  
further adapted to remove the primary overhead from the transport overhead and  
the primary payload from the transport payload, to combine the primary  
overhead with the primary payload to form a primary communication signal for  
30 transport in the primary SONET ring.

5           3.     The system of claim 1, wherein the first adapter assembly comprises:

          a first multiplexer adapted to separate the primary overhead from the primary payload;

          a second multiplexer adapted to separate the secondary overhead from  
10 the secondary payload;

          a converter adapted to receive the secondary overhead from the second multiplexer and the primary overhead from the first multiplexer and to load the secondary overhead into available overhead space of the primary overhead, thereby creating the transport overhead;

15           a cross connect adapted to receive the secondary payload from the second multiplexer and the primary payload from the first multiplexer and to combine the secondary payload with the primary payload to form a transport payload; and

          a third multiplexer adapted to receive the transport overhead from the  
20 converter and the transport payload from the cross connect and to combine the transport overhead with the transport payload to form the transport communication signal.

5           4.     The system of claim 3, further comprising a processor  
communicably connected to the first multiplexer, the second multiplexer, the  
converter, the cross connect, and the third multiplexer, the processor adapted to  
control the reception of the primary communication signal and the secondary  
communication signal, the loading of the secondary overhead into the unused  
10   overhead space of the primary overhead, and the formation of the transport  
communication signal.

          5.     The system of claim 1 wherein the second adapter assembly  
comprises:

          a first multiplexer adapted to separate the transport overhead from the  
15   transport payload;

          a converter adapted to receive the transport overhead from the first  
multiplexer and to remove the secondary overhead from the transport overhead  
to isolate primary overhead;

          a cross connect adapted to receive the transport payload from the first  
20   multiplexer and to separate the secondary payload from the transport payload to  
isolate the primary payload;

          a second multiplexer adapted to receive the primary overhead from the  
converter and the primary payload from the cross connect and to combine the  
primary overhead with the primary payload to form a primary communication  
25   signal; and

          a third multiplexer adapted to receive the secondary overhead from the  
converter and the secondary payload from the cross connect and to combine the  
secondary overhead with the secondary payload to form a secondary transport  
communication signal.

5           6.     The system of claim 5, further comprising:  
a processor communicably connected to the first multiplexer, the  
converter, the cross connect, the second multiplexer, and the third multiplexer,  
the processor adapted to control the reception of the transport communication  
signal, the removal of the secondary overhead, and the formation of the primary  
10 communication signal and the secondary communication signal.

7.     The system of claim 1, wherein the secondary overhead includes  
line overhead (LOH).

15           8.     The system of claim 1, wherein the secondary section overhead  
includes regenerator section overhead (RSOH).

9.     The system of claim 1, wherein the secondary section overhead  
includes multiplexer overhead (MSOH).

20           10.    The system of claim 1, wherein the primary SONET ring is  
operated by a first carrier and the secondary SONET ring is operated by a  
second carrier.

25

5           11. An apparatus for transporting a transport communication signal from  
a synchronous primary SONET ring to a secondary primary SONET ring, the  
transport communication signal having a transport overhead containing a  
secondary overhead including secondary section overhead and a transport  
payload containing a secondary payload wherein the transport overhead was  
10   formed by combining the secondary overhead with of a primary overhead  
wherein the secondary section overhead was combined into the unused space of  
the primary overhead, the apparatus comprising:

an adapter assembly adapted to receive the transport communication  
signal from the primary SONET ring, to remove the secondary overhead from the  
15   transport overhead, to remove the secondary payload from the transport  
payload, to combine the secondary overhead with the secondary payload to  
create a secondary communication signal and to transmit secondary  
communication signal to the secondary primary SONET ring.

20           12. The apparatus of claim 11, wherein:

the transport overhead contains primary overhead including primary  
section overhead and the transport payload contains primary payload, wherein  
the adapter assembly is further adapted to remove the primary overhead from  
the transport overhead, to remove the primary payload from the transport  
25   payload, and to combine the primary overhead with the primary payload to form  
a primary communication signal.

5           13.    The apparatus of claim 11 wherein the adapter assembly  
comprises:

          a first multiplexer adapted to receive the transport communication signal  
and to separate the transport overhead from the transport payload;

10           a converter adapted to receive the transport overhead from the first  
multiplexer and to remove the secondary overhead from the transport overhead  
to isolate the primary overhead;

          a cross connect adapted to receive the transport payload from the first  
multiplexer and to separate the secondary payload from the transport payload to  
isolate the primary payload;

15           a second multiplexer adapted to receive the primary overhead from the  
converter and the primary payload from the cross connect and to combine the  
primary overhead with the primary payload to form the primary communication  
signal; and

20           a third multiplexer adapted to receive the secondary overhead from the  
converter and the secondary payload from the cross connect and to combine the  
secondary overhead with the secondary payload to form the secondary  
communication signal.

5           14.    The apparatus of claim 13, further comprising:

          a processor communicably connected to the first multiplexer, the  
converter, the cross connect, the second multiplexer, and the third multiplexer,  
the processor adapted to control the reception of the transport communication  
signal, the removal of the secondary overhead, and the formation of the primary  
10   communication signal and the secondary communication signal.

          15.    The apparatus of claim 13, further comprising an interface adapted  
to receive the transport communication signal from the primary SONET ring and  
to transmit the transport communication signal to the first multiplexer.

          16.    The apparatus of claim 13, further comprising an interface adapted  
to receive the primary communication signal from the second multiplexer and to  
transmit the primary communication signal to the primary SONET ring.

          17.    The apparatus of claim 13, further comprising an interface adapted  
to receive the secondary communication signal from the third multiplexer and to  
transmit secondary communication signal to the secondary SONET ring.

          18.    The apparatus of claim 11, wherein the secondary overhead  
includes line overhead (LOH).

15           19.    The apparatus of claim 11, wherein the secondary section  
overhead includes regenerator section overhead (RSOH).

          20.    The apparatus of claim 11, wherein the secondary section  
overhead includes multiplexer overhead (MSOH).

20

5           21.     The apparatus of claim 11, wherein the primary SONET ring is  
operated by a first carrier and the secondary SONET ring is operated by a  
second carrier.

10           22.     A method of preparing a communication signal in a primary  
synchronous optical network (SONET) ring for transport to a secondary  
synchronous optical network (SONET) ring, the communication signal having a  
transport overhead including a secondary overhead and a transport payload  
including a secondary payload wherein the secondary overhead includes a  
15     secondary section overhead and wherein the transport overhead was formed by  
combining the secondary overhead with a primary overhead wherein the  
secondary section overhead was combined into the unused space of the primary  
overhead, the method comprising:

          removing the secondary overhead from the transport overhead;

          removing the secondary payload from the transport payload; and

20           combining the secondary overhead with the secondary payload to create  
a secondary communication signal.

25           23.     The method of claim 22, further comprising the step of transmitting  
the secondary communication signal to the secondary SONET ring.

          24.     The method of claim 22 wherein the transport overhead contains  
primary overhead including primary section overhead and the transport payload  
contains primary payload, and wherein the method further comprises:

30           combining the primary overhead with the primary payload to create a  
primary communication signal.

          25.     The method of claim 22, wherein the secondary overhead includes  
line overhead (LOH).



5           26.    The method of claim 22, wherein the secondary section overhead includes regenerator section overhead (RSOH).

          27.    The method of claim 22, wherein the secondary section overhead includes multiplexer overhead (MSOH).

10

          28. The method of claim 22, wherein the primary SONET ring is operated by a first carrier and the seconardy SONET ring is operated by a second carrier.

5           29. A method of transporting a secondary communication signal from a secondary synchronous optical network (SONET) ring across a communications path of a primary synchronous optical network (SONET) ring, the secondary communication signal including a secondary overhead and a secondary payload wherein the secondary overhead includes a secondary section overhead,

10 comprising the steps of:

receiving a secondary communications signal into an first adapter assembly communicably connected to the primary SONET ring and the secondary SONET ring, and, in the first adapter assembly, combining the secondary overhead with a primary communications signal overhead to form a transport overhead wherein the secondary section overhead is combined into the unused space of the primary overhead and combining the secondary payload with a primary communications signal payload to form a transport payload, and combining the transport payload and the transport overhead to form a transport communication signal;

20 transporting the transport communication signal across a communications path through the primary SONET ring to a second adapter assembly communicably connected with the secondary SONET ring and the primary SONET ring; and

in the second adapter assembly, removing the secondary overhead from the transport overhead, removing the secondary payload from the transport payload and combining the secondary overhead with the secondary payload to recreate the secondary communication signal.

30           30. The method of claim 29, further comprising the step of transporting the secondary communication signal to secondary SONET ring.

31. The method of claim 29, wherein the secondary overhead includes line overhead (LOH).

